International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Effects of Neurobics in Post Covid Cognitive Impaired Patients

Vijay Krishna Kumar[1], Archita Mahanta[2]

[1]Principal, Department of Physiotherapy, Dr. B. R. Ambedkar College of Physiotherapy, Bangalore, India
Affiliated to Rajiv Gandhi University of Health Science.
Email: *hoddrbracp[at]gmail.com*

[2]Intern, Department of Physiotherapy, Dr. B. R. Ambedkar College of Physiotherapy, Bangalore, India
Affiliated to Rajiv Gandhi University of Health Science.
Email: *architamahanta321[at]gmail.com*

Abstract: ***Introduction: Covid 19 affected individuals are increasing dramatically year after year, with symptoms such as loss of taste, smell, headache, unconsciousness, dizziness, as well as neurological cognitive impairments such as attention, depression, thinking and memory loss. Neurobics (neuro + aerobics) is a type of brain exercise that uses physical senses to improve cognitive performance. Objective: To find out the effects of Neurobics in Post Covid Cognitive impaired patients. Methodology: The study was conducted in Dr. B. R. Ambedkar Medical College of physiotherapy, Bangalore.30 post covid samples were taken in the age range 35 - 70 years. The participants were explained their role in the study and written consent was taken from the patient. All the samples were assessed with Mini Mental State Examination before and after the intervention. The participants received neurobic exercises for 4 weeks, 1session per day. Results: The Pre and Post intervention MMSE score was18.866±1.279 and 23.7±1.704 respectively. Paired t test showed that there was significant difference in MMSE score (t=18.397, p<0.001). Thus there was a significant improvement in the MMSE score after 4weeks of intervention. Conclusion: The study concluded that neurobics exercises are effective to improve cognitive function in post covid patients.***

Keywords: Neurobics, Post Covid - 19, Cognition, MMSE

1. Introduction

A previously unnamed coronavirus that arose from Wuhan, China, in late December 2019 caused a serious outbreak that spread throughout numerous Chinese cities and around the globe. The condition is referred to as Coronavirus Disease - 2019 (COVID - 19, by WHO on February 11, 2020).1 Historically, COVID - 19 has been classified as a respiratory condition. However, up to 85% of patients who experience severe illness and about 35% of all patients show neurological symptoms as headache, dizziness, myalgia, or loss of taste and smell.2 There is growing evidence that COVID - 19 causes brain damage, especially when neurological symptoms are present.3 Hemorrhagic lesions in the orbitofrontal cortex, medial temporal lobe and hippocampus[4], bilateral thalami, and subinsular regions are just a few examples of the anomalies that have been reported in numerous investigations Those who have "post - COVID - 19 syndrome" (PASC) or "Long COVID" (COVID - 19 infection and SARS CoV - 2) provide the majority of the evidence that suggests cognitive dysfunction may arise after COVID - 19 infection[5]**.** One of the most prevalent symptoms of Long COVID reported in study is cognitive dysfunction, which affects about 70% of patients[6]. When it comes to cognitive dysfunction, it can be challenging to determine how much self - reported cognitive deficiencies with broad definitions—like "difficulty concentrating" and "brain fog"—translate into observable alterations in cognitive performance. Although there are numerous lines of evidence that people with Long COVID develop cognitive symptoms, there has been relatively little research done to objectively measure cognition after COVID - 19.

Neurobic exercise, or "Neuro + Aerobics = Neurobics, " is a special form of brain training based on the most recent results in science. A combination of bodily senses, such as vision, hearing, taste, smell, touch, and an emotional sense are presented in the brain exercise programme, and the daily routine is regularly changed. In order to continuously strengthen and expand brain cells, it increases neural activity. Exercises that engage new brain circuits and boost neurotrophin production help to maintain the strength of synapses and nerve cells. Brain blood flow is increased and neuronal systems are activated by neurobics. The medial temporal lobe, which serves as a temporary storage area for new information, is directly involved in neurobic exercise along with the cortex[7] and then gradually transfers to permanent storage in the cortex. The memory is improved by storing information and using the sense of scent in emotional memory [8]. Exercises in cognitive therapy alleviate loss of perceptual attention, reduce loss of motor control, and improve dual tasking[7]. The most developed region of the human brain is the cerebral cortex. It is made up of a lot of various sections, each of which is designed specifically to retrieve, encode, and store data from all senses. Additionally, the connections in the cerebral cortex's regions are made up of hundreds of neural pathways that can combine to store memories in an infinite number of ways because of the system's complexity and the myriad ways in which the brain's extensive pathways can be combined[8]**.** Activities that disrupt your routine and increase the flexibility and agility of your senses are included. Thus the aim of the present study is to find out the effect of neurobics in post covid cognitive impaired patients.

2. Review of Literature

1) **A. V. Balgaonkar**[9] did research to create a curriculum for students to train their neurobics skills and engage their brains. The elements that affect neurobics and their impact on cognition have been examined, and the advantages of neurobics for students' overall development have been highlighted. For the study, the researcher employed a before - and - after experimental and control group design. The samples included 140 pupils, with 70 from each group of 70+70 in the third and fourth grades. Behavioural performance had been used to assess the impact of neurobics. The mean, SD, and "t" tests were used to assess the statistical data, and it was found that Neurobics had a favourable impact on students' cognitive abilities and practical skills. Neurobic exercise helps preserve or enhance cognitive functions
Cambridge University Press: 15 April 2020

2) **Saifon Kanthamalee and Kanid Sripankaew**[10] led a quasi - experimental study, looked at how neurobic exercise affected memory improvement in elderly dementia patients. For four weeks, a neurobic exercise programme was conducted on alternate days with selected participants. The tests included the Mini - Mental State Examination—Thai Version 2002, the Memory test, and a Neurobic Exercise Program. The outcomes showed that the experimental group's average memory scores after completing the Neurobic Exercise Program were statistically and substantially higher than they had been before completing the programme.
Journal of Nursing Education and Practice, 2014

3) **Ketaki Ajit Patani**[7] did a study to determine how Neurobic exercises affected memory and quality of life in post - stroke patients. There are 40 stroke patients in total, ranging in age from 50 to 80 years old. This Investigation used randomised control trials (permuted block randomization). The patient was given a brief explanation of the MOCA (Montreal cognitive assessment scale) and SIS (stroke impact scale) before the scores were recorded. Results showed that neurobics exercises were successful in enhancing both cognitive function and overall quality of life.
Journal of Applied Dental and Medical Sciences, 3 July - September2020

3. Methodology

1) Study Criteria
Study design - Experimental Study
Study setting - Subjects were taken from Dr. B. R. Ambedkar medical college and hospital.

2) Sample Criteria
Sample design - Purposive sampling
Sample size - 30
Sampling population - Patients affected with COVID19 fulfilling the inclusion criteria and exclusion criteria are the population of this study.

3) Criteria for sample collection:

A. Inclusion criteria
- Covid19 positive patients with mild neurological impairments such as attention loss, Depression, Clear thinking and memory loss etc.
- Mini Mental State Examination Points above 20.
- 35 - 70years
- Both genders (Adults)

B. Exclusion criteria
- Ventilated ICU patients
- Post surgery patients
- Psychiatry
- Mentalillnes
- Encephalopathy
- Severe memory loss
- Child/infants

4) Place of Study:
Dr. B. R. Ambedkar Medical College and Hospital, Bangalore.

5) Study Duration:
4weeks, 1session per day

6) Materials used in the study:
- Pen
- Paper
- Flower
- Treadmill
- Rocks
- Perfume

7) Outcome measure: Mini Mental State Examination Scale

4. Procedure

1) The study was conducted on 30 randomly selected patients who have been diagnosed as Covid - 19 positive in Dr. B. R. Ambedkar Medical College and hospital Bangalore.
2) The purpose and procedure of the survey was explained to each subject and consent was taken.
3) The basic demographic data of each patient was collected and the Mini Mental State Examination Scale (MMSE) was the instrument employed to assess the cognitive impairment among the covid - 19 patients.
4) Pre assessment was taken by MMSE for post covid patients who got points above 20 were taken as a sample for intervention.
5) During intervention our treatment neurobics exercise were[17]
   - Walking down the hallway with eyes closed.
   - Write a small text from left to right.
   - Spend time smelling all the plants and flower.
   - Listen to music smelling favorite perfume.
   - Walk backwards on the treadmill, slow speed.
   - One leg balancing exercise.

- Feel the texture of different objects like rocks, shells etc.
- Use your Non Dominant hand to work.

6) Post assessment was taken by MMSE points followed by Statistical analysis.

5. Data Analysis and Interpretation

Statistical analysis of the data was done by using the software SPSS20.0. Descriptive statistics were calculated and summarized. It includes frequency, percentage, mean and standard deviation. Inferential statistics had been carried out in the present study. Pre post comparison in MMSE was done using paired t test. Level of significance was set at 5%.

Table 5.3: Pre and Post comparison in MMSE

		Mean	N	Std. Deviation	t value	P value
	Pre	18.8667	30	1.27937	18.397	P<0.001
	Post	23.7000	30	1.70496		

The statistical analysis of MMSE using paired t test showed, pre MMSE evaluation score was18.866±1.279 increased to 23.7±1.704 with t value=18.397 and p<0.001. The analysis showed statistically significant improvement of 4.833 from pre to post.

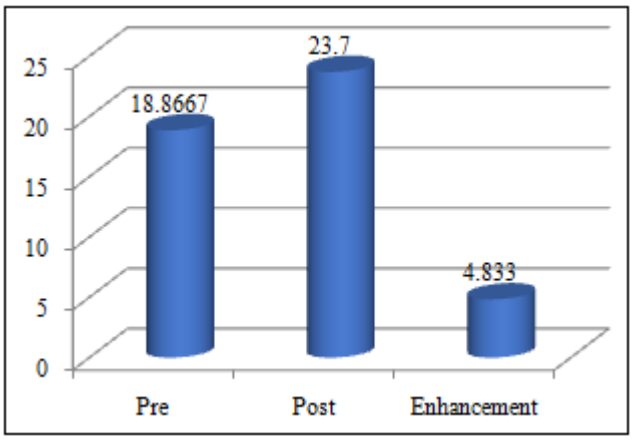

Figure 5.3: Pre and Post mean MMSE evaluation score

6. Discussion

Long - term COVID - 19 effects on cognition are becoming a significant public health concern. In COVID - 19 survivors, SARS - CoV - 2 can lead to a number of neurological complications, such as myalgias, hypogeusia, hyposmia, polyneuropathy, myositis, cerebrovascular disorders, encephalitis, and encephalopathy. The central nervous system's vulnerability to SARS - CoV - 2 has sparked a lot of interest in neuropsychiatric research among COVID - 19 survivors. Cognitive issues are typical in the acute[18]. The present study aimed to find out the effectiveness of neurobic exercise in post covid cognitive impaired patients. In a cohort study conducted by Yu - hui Liu[18] (2021**)** on post covid cognitive impairments in patients. At the acute stage of the infection, more than one - third of COVID - 19 hospitalised patients exhibit a range of neurologic signs, including altered cognitive and mental state, cerebrovascular disorders, headache, vertigo, anosmia, as well as neurological sequelae. Cognitive issues with acute onset are frequent. The purpose of his study was to identify factors for cognitive impairment in individuals who had recovered from COVID - 19 and to look at the long - term effects of SARS - CoV - 2 infection on cognitive changes six months after recovery.

In the current study, participants were encouraged to practise all six senses and to disrupt a normal activity in an unexpected method to improve nerve cell stimulation. Participants got the entire programme to use senses in joining two or more senses per day during all Neurobic Exercise Program sessions. Thus, combining two or more senses stimulates brain functions involved in memory, such as the frontal, parietal, temporal, and occipital lobes. Neurobics seeks to assist in maintaining a consistent level of mental fitness, strength, and flexibility as we age. The neurobic exercise boosts neural activity, which leads to increased connectivity between brain areas and induces nerve cells to manufacture natural brain nutrition known as "neurotrophins. " Neurobics is a technique used to activate the dormant cells of the brain. It may be beneficial for those who are unable to express themselves and suffer greatly in this competitive society[19].

The present study showed that neurobic exercises were effective in improving cognition in post covid patients. According to Saifon Kanthamalee et al[10]. (2014), who did a study on the effect of Neurobic Exercise on Memory Improvement in Dementia Patients. Selected participants were enrolled in the Neurobic Exercise Program every two days for four weeks. The results showed that the experimental group's normal memory scores after receiving the Neurobic Exercise Program were statistically and suggestively higher than before receiving the Neurobic Exercise Program at the level of p.001. The study revealed that the Neurobic Exercise Program significantly improved memory retention in the patients with dementia. According to Ketaki Ajit Patani[7] (2020), Neurobics exercises are useful in improving cognitive function as well as quality of life. According to P. Napatpittayatorn et al.1[2] (2019), neurobic exercise can increase the level of serum BDNF (Brain developed neutrophic factor), indicating improved brain function. As a result, neurobic exercise can be used to develop an effective brain training programme to lower the risk of dementia in the elderly.

Most of the studies have focused on cognitive rehabilitation and post covid rehabilitation of patients. There is insufficient evidence of studies which have assessed cognition related function in post covid patients. The result obtained in this study indicated that there was significant increase in cognition level among the participants of the experimented group. There occurred significant changes in mean MMSE score post treatment in the experimented group i. e.23.7 ± 1.704. The overall result of present study revealed that neurobic exercises are effective in post covid cognitive impaired patients.

7. Conclusion

Neurobic exercises showed significant improvement with the help of MMSE to improve the cognitive level in Post Covid rehabilitation. Cognitive abilities can be maintained or improved by neurobic exercise. As a result, neurobic

exercises can be used as an effective method to create a brain training program to reduce the risk of dementia in the elderly.

8. Limitation and Recommendations

1) This study was conducted with small sample size and in future, studies with a larger sample size can be conducted for better results.
2) This study showed the immediate effectiveness of the treatment; therefore, it is not possible to know the long - lasting effects of the treatment, for which a study of longer duration can be conducted

References

[1] Huang C, Wang Y. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet.2020; 6736 (20): 30183 - 5.
[2] Mao, Ling, Huijuan Jin, Mengdie Wang, Yu Hu, Shengcai Chen, Quanwei He. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. JAMA neurology.2020; **77** (6): 683–690.
[3] Kandemirli, Sedat G, Lerzan Dogan. Brain MRI findings in patients in the intensive care unit with COVID 19 infection. Radiology.2020; 297 (1): 232 - 235.
[4] Moriguchi, Takeshi, Norikazu Harii. A first case of meningitis associated with SARS - Corona virus - 2. International journal of infectious diseases.2020; 94: 55 - 58.
[5] COVID - 19 rapid guideline: managing the long term effects of COVID19. National institute for health and care excellence (NICE).2020 Dec18; ISBN - 13: 978 - 1 - 4731 - 3943 - 5.
[6] Hannah E. Davis, Gina S Assaf. Characterizing long COVID in an international cohort: 7 months of symptoms and their impact. ELSEVIER.2021; 38: 2589 - 5370.
[7] Ketaki Ajith Patani. Effects of neurobic exercise on memory and quality of life in patients with post stroke. Journal of applied dental and medical science.2020; 6 (3): 2454 - 2288
[8] Lawrence C Kats. Keep your brain alive. Workman publishing company New York.2000 April. books. google. com
[9] A. V. Balgaonkar. Effect of neurobics in cognition of students. Cambridge University Press.2020; 28 (S1): 1 - 1.
[10] Saifon Kanthamalee, Kanid Sripankaew. Effect of neurobics exercise on memory enhancement in the elderly with dementia. Journal of nursing education and practice.2014; 4: 1925 - 4059.
[11] Pooja Jain, Dr. Prabhakar Kashyap. Effectiveness of Psychoneurobics on the level of stress in Indian woman. International journal of research publications and reviews.2021; 2: 1121 - 1126 .
[12] Phubate Napatpittayatorn, Thanomwong kritpet. Effects of neurobics exercise on cognitive function and serum brain - derived neurotrophic factor in the normal to mild cognitive impaired older people: A randomised control trial. J. Sci. Technol.2019; 41 (3): 551 - 558.
[13] Maura Mitrushina. Reliability and validity of MMSE in neurologically intact elderly. Journal of clinical psychology.2019; 47 (4): 537 - 43.
[14] Rania Daroische. Cognitive impairment after COVID19 A review on objective test data. Fornt Neurol.2021; 12: 699582.
[15] Felicia Ceban, Susan ling. Fatigue and cognitive impairment in post - covid - 19 syndrome: A sysytematic review and meta - analysis. Brain Behav Immune.2022; 101: 93 - 135.
[16] K W Miskowiak. Cognitive impairments 4months after Covid19 hospital discharge: Pattern, Severity and association with illness variables. Eur Neuropsychopharmacol.2021; 46: 39 - 48.
[17] Dr. Jockers. Using neurobics to improve your brain. DrJockers. com. https: //drjockers. com/using - neurobics - improve - brain.
[18] Yu - Hui Liu. One - Year Trajectory of Cognitive Changes in Older Survivors of COVID - 19 in Wuhan, China. JAMA Neurology.2022; 79 (5): 509 - 517.
[19] Barkha Shroff. Effectiveness of neurobic exercise in improving cognition in young individuals. International journal of scientific research.2020; 9 (2): 40 - 41.